Parkinson’s disease is a known neurological disease that affects the substantia nigra of the brain. The substantia nigra produces dopamine, a neurotransmitter that controls muscle movement [1]. In Parkinson’s disease, the brain cells that make dopamine degenerate or die. There are many theories, but no definite answer, to what causes these brain cells to do so. Several environmental pollutants have been implicated as possible contributors to Parkinson’s disease. Those include iron, zinc, aluminum, manganese, copper, cobalt, cadmium and lead [2]. Studies have shown that there is a strong connection between environmental pollutants and Parkinson’s disease. The current work explores the mechanisms by which these environmental pollutants are linked with Parkinson’s disease and the aggregation of α-synuclein and loss of dopamine[3]. The environmental pollutants will enter the brain through ingestion and inhalation. These pollutants aggregate the mis-folding of α-synuclein, which then combine to form fibrils that make up Lewy bodies and the formation and release of peroxidases (HO2) in the presence of iron[4]. This forms Reactive Oxidative Species (ROS), damages organelles and proteins, increases the protein aggregation of α-synuclein, and creates fibrils that make up Lewy bodies [5]. The current work explores the possibility of environmental pollutants causing Parkinson’s disease. The current research indicates that a mixture of environmental pollutants will make this connection even stronger. Additional research is needed to study the various environmental pollutants causing Parkinson’s disease.

INTRODUCTION

Neurodegenerative disorders are a familiar product of aging [6]. The etiology of certain health effects such as Parkinson’s disease have yet to be definitely determined. Technology has advanced in the last decades to allow for medical research to advance in the detection of contributing factors. Parkinson’s disease is a loss of cognitive and physical function [7]. Research shows that metal cations play a large role in Parkinson’s disease by allowing the mis-folding of α-synuclein protein to form fibrils by interfering with naturally repelling anions [8]. In particular, combinations of metals through routes of inhalation and ingestion have been shown to contribute to the development of neurodegenerative disorders [9]. The substantia nigra, lewy bodies, and dopamine synthesis are areas and functions of the brain proven to be affected in Parkinson’s. Understanding that environmental factors play a role in most diseases, this allows for regulation and action to be implemented in order to protect human health.

EPIDEMIOLOGY

County level Age- and Race-Standardized Prevalence of Parkinson’s Disease

Two examples of metals that are commonly related to the onset of Parkinson’s Disease. The concentrations of soil were analyzed taken ≤5 cm.

Environmental Concentrations

Inhalation

Ingestion

Routes of Exposure

CONCLUSION

Present research relates environmentally relevant heavy metals to the development of neurodegenerative disorders such as Parkinson’s disease. Metal cations such as iron, zinc, aluminum, manganese, copper, cobalt, lead, and cadmium aggregate the mis-folding of the α-synuclein proteins. This result is most likely due to the ability of the metal cations to interfere with the naturally repelling, negavely charged, regions of the α-synuclein protein, causing them to attract one another and become tangled. This effect, along with the ability of these metals to form ROS, leads to the formation of Lewy bodies. This further damages cell organelles and proteins leading to formation of more fibril containing Lewy bodies which are a key feature in Parkinson’s disease [17].

REFERENCES